

Measurement and Simulation of Source-Generated Halos in the University of Maryland
Electron Ring (UMER)

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An area of nonlinear beam physics that is important in a number of beam systems, and is inadequately understood, is the generation and evolution of beam halos. Study of beam halos therefore has served as one rationale for recent research on UMER. While it was expected that halo formation would primarily result from nonlinear dynamics during beam propagation, recent experiments and simulations have instead identified imperfections in the source geometry, particularly in the region near the emitter edge, as a potentially significant source of halo particles. The edge-generated halo particles, both in the experiments and the simulations are found to pass through the center of the beam a short distance downstream of the anode plane. Understanding the detailed evolution of these particle orbits is therefore important to designing any aperture to remove the beam halo. Both experimental data and simulations will be presented to illustrate the details of this process, as well as proposed means of mitigation.

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